Docket No. 740145-152

#9 Response 5/12/03

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:	)	
Nobuyuki HISHINUMA et al.	)	Group Art Unit: 2878
Serial No. 09/530,955	)	
Filed: May 16, 2000	)	Examiner: A. Quash
For: ULTRAVIOLET ILLUMINATION EQUIPMENT	)	

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as First Class Mail in an envelope addressed to: Commissioner of Patents, Alexandria, VA 22313 on May 14, 2003.

April Campbell

April Campbell

RESPONSE

Commissioner for Patents
Alexandria, VA 22313

Sir:

The Office Action of January 16, 2003 was received and carefully reviewed. For the reasons advanced in detail below, reconsideration and withdrawal of the currently pending rejections is requested. Claims 6-15 remain pending.

The presently claimed apparatus is directed to solving the problem of removing unwanted reaction products which adhere to the front surface (i.e., surface facing a reaction chamber) window of a receptacle housing a dielectric-barrier discharge lamp which has replaced the previously used UV mercury lamps. As discussed in the specification, at page 2, problems occur when reaction products, formed as a result of decomposition of reactants in the chamber outside the receptacle are carried by convection to the front surface of the window. Conventional dielectric-barrier discharge lamps provide a temperature of only about 70 C° in front of the lamp which is insufficient to heat the front surface of the window. As a consequence, reaction products in the chamber outside the receptacle are not carried away by convection, but instead are deposited on the window. These deposits build up over time and

eventually peel off the window surface contaminating the workpiece processing environment.

Turning to the rejection of claims 6, 7 and 12, under 35 U.S.C. § 103(a), as being obvious in view of the teachings of the Koji (JP '079) combined with the teachings Sukeyoshi et al (JP '468), this rejection is respectfully traversed since deficiencies of the Koji patent are overcome by the teachings of Sukeyoshi et al. Particularly, the Sukeyoshi et al patent does not teach or suggest a "heating means for preventing formation and accumulation of debris on the window" as alleged by the Examiner.

The Koji patent does teach, like the specification at page 1, line 8, to page 2, line 3, that it is known to dry process (wash) a substrate (3) employing an apparatus which includes a treatment chamber (5) for the substrate and a separate receptacle (21) housing a dielectric-barrier discharge lamp (7) having a window (19) facing the treatment chamber. However, the Koji does not make any mention of a problem with regard to the accumulation of reaction products on the front surface (i.e., surface facing treatment chamber) of the window as a result of using the dielectric-barrier discharge lamp (with its low operating temperature). Further, as the Examiner notes in the Office Action, the Koji patent does not teach or suggest a "heating means for preventing formation and accumulation of debris on the window" surface.

To remedy this deficiency, the Examiner cites the Sukeyoshi et al patent which allegedly teaches a "heating means for preventing formation and accumulation of debris on the window." However, a detailed review of the translation (attached) of the Sukeyoshi et al. patent reveals that the patentees are not concerned with preventing formation and accumulation of reaction product debris on the window. To the contrary, Sukeyoshi et al., at paragraphs [0002]-[0003], are concerned with the uniform heating of the front surface of a large (i.e., 8 inch semiconductor) wafer (4) in order to ensure removal of organic substances, i.e., resists, from the surface of the wafer by drying processing with ozone gas. The patentees note that the construction

of an appropriately sized slip ring, which enables electric power to be supplied to the built-in heater within the rotating wafer support, is difficult. To remedy this problem the patentees teach, at paragraphs [0004] and [0006], providing the top, bottom and side walls of the reaction chamber (1) with an auxiliary resistance or infrared heater so that the "homogeneity of wafer temperature improves" and improved "removal speed of the organic substance with little dispersion is obtained."

Sukeyoshi et al. specifically teach, at paragraph [0007], that the organic substance reacts with ozone (with the aid of UV radiation from UV lamps (7) positioned outside the reaction chamber) which has been injected by nozzles (6) through transparent nozzle plate (5) to form carbon dioxide and steam which are exhausted from the reaction chamber via the exhaust port (8) positioned beneath the wafer stage (2). The result of employing the auxiliary heaters in the side walls of the reaction chamber is taught by Sukeyoshi et al., at paragraphs [0005] and [0011], to be improved homogeneity of the wafer temperature and improved uniformity ("little dispersion") of removal of the organic substance from the wafer with little non-decomposed organic material remaining.

The Sukeyoshi et al. patent contains absolutely no discussion or appreciation of the deposition of reaction products, i.e., carbon dioxide and steam, on the walls of the reaction chamber, and, in particular, deposition upon the transparent nozzle plate (window) through which the UV radiation passes. At best, the patentees teach, in Figures 1(b), 4(b) and paragraph [0008], positioning a heater in or on the wall adjacent the nozzle plate (but not on the nozzle plate itself) in order to keep the walls, and not the transparent nozzle plate, at 150-200 C° while the wafer is heated to 300 C° by the wafer stage heater during the organic substance removal process. There is no teaching that an auxiliary heater so positioned will heat the transparent nozzle plate to prevent formation of deposited reaction products (debris) on the nozzle plate, and further, such heating would be non-uniform in that only the edges of the nozzle plate are in contact with the side walls of the reaction chamber. Further, there is no

teaching or suggestion in Sukeyoshi et al. of providing the auxiliary heaters in the receptacle containing the UV radiation lamp or providing the auxiliary heaters on the surface of the transparent nozzle plate (window) as presently set forth in dependent claims 6-9, 13 and 14.

One of ordinary skill in the prior art would have been taught by Sukeyoshi et al. to provide the apparatus of Koji with a reaction chamber (5) having auxiliary heaters positioned in the walls of the reaction chamber (5) for the purpose of heating the substrate to be processed. There is no teaching in Sukeyoshi et al. of providing the receptacle (21) of Koji, having a transparent window and containing a dielectric-barrier discharge lamp, with a heating means, i.e., inside the receptacle or on the transparent window, for heating the transparent window to sufficient temperature to prevent deposition of reaction products. Consequently, a *prima facie* case of obviousness has not been established by the combination of Koji and Sukeyoshi et al. and the rejection of claims 6, 7 and 13, under § 103, must be withdrawn.

With regard to the rejection of claims 8-11 and 13-15, under § 103, employing the Hiramoto et al. ('158) reference in combination with the teachings of Koji and Sukeyoshi et al., it appears the Examiner has misunderstood the teachings of Hiramoto et al. Specifically, the latter patentees (Figures 1, 7, 8) teach forming an electrode, for generating the discharge, on the surface of the dielectric-barrier discharge lamp (1 or 18) itself and not on the surface of the chamber (5 or 25) housing or jacketing the discharge lamp. Therefore, combining the teachings of Hiramoto et al. with those of Koji would teach one of ordinary skill in the prior art to place the electrode for generating the discharge in the lamp on the surface of the discharge lamp itself and not on the transparent surface of the chamber housing or jacketing the discharge lamp. Consequently, a *prima facie* case of obviousness has also not been established by the combination of teachings of Koji, Sukeyoshi et al. and Hiramoto et al., and the rejection of claims 8-11 and 13-15, under § 103, must also be withdrawn.

While the present application is now believed to be in condition for allowance, should the Examiner find some issue to remain unresolved, or should any new issues arise, which could be eliminated through discussions with Applicants' representative, then the Examiner is invited to contact the undersigned by telephone in order that the further prosecution of this application can thereby be expedited.

Lastly, it is noted that a separate Extension of Time Petition (one month) accompanies this response along with a check in payment of the requisite extension of time fee. However, should that petition become separated from this Amendment, then this Amendment should be construed as containing such a petition. Likewise, any overage or shortage in the required payment should be applied to Deposit Account No. 19-2380 (740145-152).

Respectfully submitted,

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